

CLAIMS

What is claimed is:

1. A PEM fuel cell comprising:
an electrode plate having a flow field formed therein; and
a membrane-electrode assembly including permeable diffusion media disposed adjacent said electrode plate, said permeable diffusion media being rigid along a transverse axis, flexible along a lateral axis and having a substantially incompressible thickness, wherein said transverse axis crosses first channels of said flow field, said first channels defining a predominate flow direction.
2. The PEM fuel cell of claim 1, wherein said permeable diffusion media is electrically conductive.
3. The PEM fuel cell of claim 1, wherein said permeable diffusion media comprises a first plurality of fibers substantially aligned along said transverse axis, a second plurality of fibers substantially aligned along said lateral axis, and wherein each of said first plurality of fibers is larger than each of said second plurality of fibers.
4. The PEM fuel cell of claim 3, wherein each of said first plurality of fibers is of a larger diameter than each of said second plurality of fibers.

5. The PEM fuel cell of claim 3, wherein each of said first plurality of fibers is of a greater length than each of said second plurality of fibers.
6. The PEM fuel cell of claim 3, wherein each of said first and second plurality of fibers comprise carbon.
7. The PEM fuel cell of claim 3, wherein each of said first and second plurality of fibers comprise graphite.
8. The PEM fuel cell of claim 3, wherein each of said first plurality of fibers comprises one of carbon and graphite and each of said second plurality of fibers comprises one of carbon and graphite.
9. The PEM fuel cell of claim 1, wherein said permeable diffusion media further comprises a plurality of strips substantially aligned along said transverse axis.
10. The PEM fuel cell of claim 9, wherein each of said plurality of strips is made of stainless steel.

11. A diffusion media for implementation with a PEM fuel cell, comprising:
 - a first plurality of fibers aligned along a lateral axis for enabling deformation of the diffusion media along said lateral axis;
 - a second plurality of fibers aligned along a transverse axis for prohibiting deformation of the diffusion media along said transverse axis; and
 - wherein said first and second plurality of fibers are meshed for enabling fluid permeability through the diffusion media
12. The diffusion media of claim 11, wherein said first and second plurality of fibers are electrically conductive.
13. The diffusion media of claim 11, wherein said second plurality of fibers are of sufficient size to provide high tensile and compressive strengths in a thickness of the diffusion media.
14. The diffusion media of claim 13, wherein a length of said second plurality of fibers is predefined to provide said high tensile and compressive strengths.
15. The diffusion media of claim 14, wherein a diameter of said second plurality of fibers is predefined to provide said high tensile and compressive strengths.

16. A permeable diffusion media for implementation in a proton exchange membrane (PEM) fuel cell, comprising:

a permeable body defining a machine direction and a cross-machine direction, said body having a modulus of elasticity that is greater in said cross-machine direction than in said machine direction and having a substantially incompressible thickness.

17. The permeable diffusion media of claim 16, wherein said permeable body is electrically conductive.

18. The permeable diffusion media of claim 16, further comprising:

a first plurality of fibers substantially aligned in said cross-machine direction;

a second plurality of fibers substantially aligned in said machine machine;

wherein each of said first plurality of fibers is larger than each of said second plurality of fibers.

19. The permeable diffusion media of claim 18, wherein each of said first plurality of fibers is of a larger diameter than each of said second plurality of fibers.

20. The permeable diffusion media of claim 18, wherein each of said first plurality of fibers is of a greater length than each of said second plurality of fibers.

21. The permeable diffusion media of claim 18, wherein each of said first and second plurality of fibers comprise carbon.

22. The permeable diffusion media of claim 19, wherein each of said first and second plurality of fibers comprise graphite.

23. The permeable diffusion media of claim 18, wherein each of said first plurality of fibers comprises one of carbon and graphite and each of said second plurality of fibers comprises one of carbon and graphite.

24. The permeable diffusion media of claim 16, further comprising a plurality of strips substantially aligned in said cross-machine direction.

25. The permeable diffusion media of claim 24, wherein each of said plurality of strips is made of stainless steel.